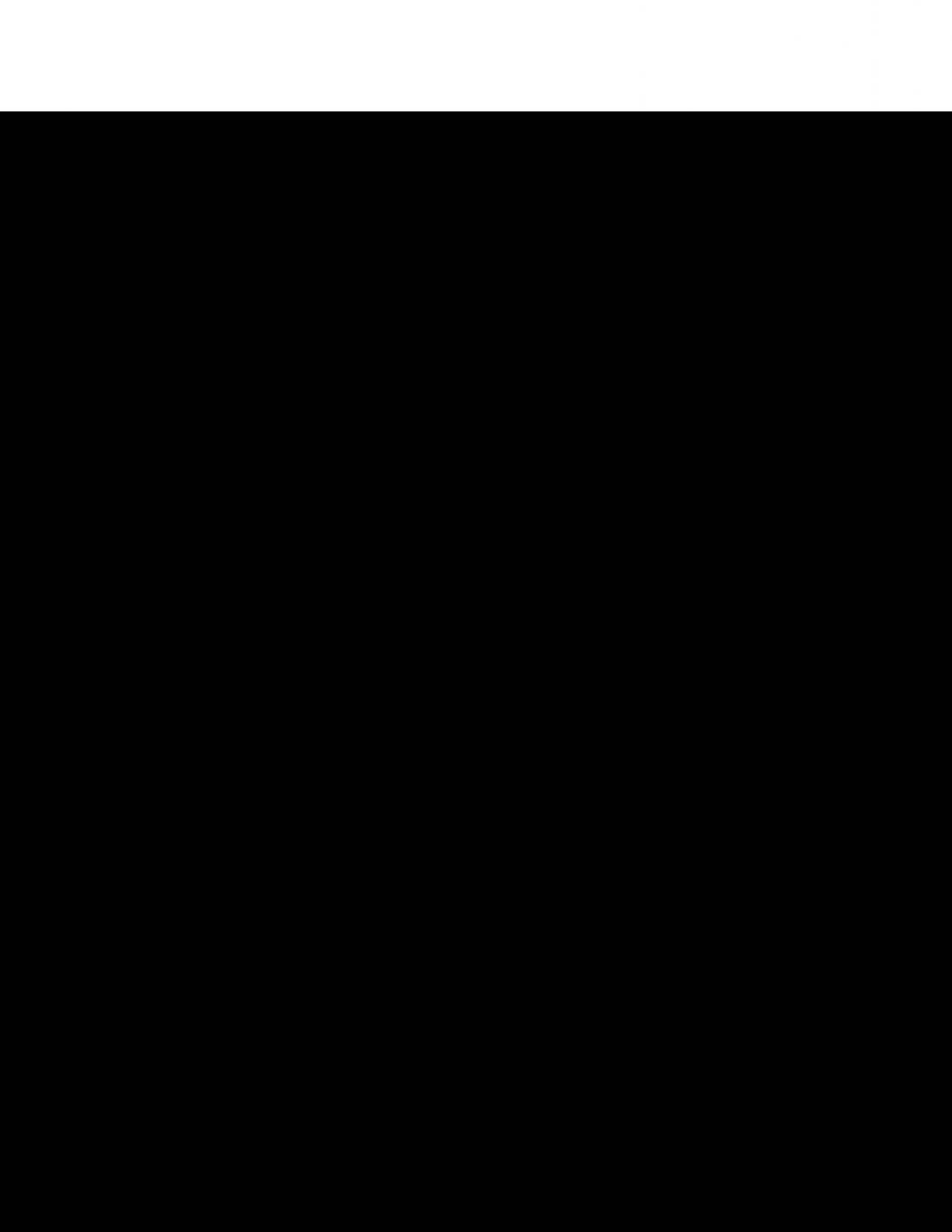


OWNER'S MANUAL  
 MODEL PA-700  
 STEREO POWER AMPLIFIER

<u>DESCRIPTION</u>	<u>FORM NUMBER</u>
Important .....	00620
Description .....	01510
Indicator and Protection Circuits .....	01540
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-IMPORTANT-

PLEASE READ THIS PAGE BEFORE OPERATING  
YOUR  
EV-TAPCO POWER AMPLIFIER

Your new EV-TAPCO amplifier is designed to provide years of trouble free performance.

Observing these few precautions will insure proper operation.

- All connections should be made to the power amplifier with the power OFF.
- Speaker fuses should be used to afford maximum speaker protection.
- Never connect the output of one channel to that of another.
- Connect the power cord to the proper voltage mains as indicated on the rear of the amplifier. Conversion to another voltage requires internal rewiring.
- Do not remove the amplifier's cover. Amplifiers may not be covered under warranty if they are tampered with. There are NO adjustments within. Potentially lethal voltages exist within the amplifier. Refer all service work to an authorized EV-TAPCO service station.

## DESCRIPTION

The EV-TAPCO PA-700 is a professional stereo power amplifier.

An on/off circuit-breaker switch, gain controls, and the indicator lights are located on the front panel; all other external features are mounted on the rear.

Standard 1/4" phone jacks are provided for unbalanced line use only. Dual input jacks are provided for looping of power amplifiers. (See input connection sections).

The five-way binding posts used for output connections accept banana plugs, spade lugs, or tinned wire. A recessed switch converts the amp into a bridged mono mode. 70.7 volt distribution lines can be easily driven in the Mono Mode.

Features include an error-sensing op-amp input stage, to stabilize performance; a heat sink mounted bias circuit, to provide precise temperature compensation; and a full complementary output stage, featuring six 150 watt transistors in each channel (1800 watt total dissipation capability). Extensive circuitry is used to protect the amplifiers and whatever is connected to them. (See section #01540).

Mechanical features include: a 16 gauge welded steel chassis, two massive aluminum heat sinks, and modular construction.

All active audio circuit components are contained in two modules, one for each channel. These modules consist of a glass epoxy circuit board mechanically coupled to a large aluminum heat sink. Horizontal fin arrangement and grill work on the sides allows exit of forced air currents to flow outward and away from the amplifier. Removal of the modules for modification or service is easily accomplished by removing four support screws and the plug-in electrical connectors.

## INDICATOR AND PROTECTION CIRCUITS

### INDICATOR CIRCUITS

The PA-700 features a pair of red LED's, one for each channel, in clipping indicator circuits that are activated when the amplifier output voltage tries to exceed the available power supply voltage. Distortion rises significantly because there is not enough energy to accurately reproduce the signal. As this condition can occur at a rate too fast for the eye to follow, the LED's remain lit for 1/4 second once clipping is sensed. A third red LED is employed as a "power on" indicator.

### PROTECTION CIRCUITS

In your unit, both the primary mains (A.C. line) overload protection and the on/off switch have been combined into a rocker-actuated, magnetic circuit breaker, whose operation, unlike fuses, is predictable and independent of temperature. Returning the switch to the on position resets the system.

Speaker protection is provided by relay circuitry that disconnects the load whenever a short-circuit or harmful D.C. current is present across the output terminals. Transients created when removing extremely large signals from the load are suppressed by magnetic-field arc-interruptors mounted on the relay case.

The relay circuit includes a time delay that allows the amplifier to stabilize before the speakers are connected. It also disconnects the speakers the instant the circuit breaker is shut off, eliminating annoying pops and clicks.

SPECIFICATIONS: MODEL PA-700OUTPUT POWER AND TOTAL HARMONIC DISTORTION8 OHM FTC RATED OUTPUT POWER

210 watts minimum sine wave continuous average power output per channel with both channels driving 8-ohm loads over a power band from 20 Hz to 20 kHz. The maximum Total Harmonic Distortion at any power level from 250-milliwatts to 210 watts shall be no more than 0.1%.

4 OHM IHF DYNAMIC HEADROOM \* OUTPUT POWER

355 watts \*IHF test signal consisting of 20 cycles of 1kHz sine wave followed by 480 cycles of a level 20db lower. The level of the 20 cycle portion is adjusted to a level just below limiting.

BRIDGED MODE OUTPUT POWER

710 watts into 8 ohms \*IHF test signal consisting of 20 cycles of 1kHz sine wave followed by 480 cycles of a level 20dB lower. The level of the 20 cycle portion is adjusted to a level just below limiting.

When adjusted for 70.7 volt RMS lines the PA-700 will deliver 624 watts into 8 ohms with IHF dynamic headroom test waveform.

All Specifications and features are subject to change without notice.

SPECIFICATIONS

Intermodulation Distortion:	Less than 0.03% from 250 milliwatts to rated output (60 Hz & 7 kHz, 4:1)
Small Signal Frequency Response:	+0, -3dB, 1Hz to 100kHz +0, -0.25dB, 20Hz to 20kHz
Hum and Noise Level:	Better than 102dB below rated output into 8-ohms (unweighted, 20Hz to 20kHz)
Input Sensitivity:	1.23 volts for maximum output. Voltage gain 30.24dB (32.5 times)
Input Impedance:	Greater than 10k ohms
Damping Factor:	Greater than 150 to 1 referenced to 8-ohms @ 1kHz
Output Impedance:	Designed for any load impedance equal to or greater than 4 ohms
Power Requirements:	Internal Jumper selects either 100, 120, 200, 220, or 240 volts; 50/60Hz.
Semiconductor Complement	<u>PA-700</u> 2 Op Amp IC's (equivalent to 44 transistors each), 39 transistors, 8 zener diodes, 25 diodes and 3LED's.
Dimensions:	5 1/4 inch by 19-inch standard rack front panel by 11 3/4 inches deep (13.34 cm x 48.26 cm x 29.85 cm)
Weight:	41 lbs., net; 47 lbs shipping 18.64 Kg. net, 21.36 Kg. shipping



## UNPACKING AND SET-UP

Your EV-TAPCO Power Amplifier is shipped in an advanced packing container.

### SAVE THE CONTAINER AND ALL PACKING MATERIAL!

The container should be saved in the event the unit is moved or shipped at some future date. Replacement containers are available from EV-TAPCO.

Inspect the unit for damage in transit immediately upon receipt. If damage is found, notify the transportation company immediately. Only the consignee may institute a claim with the carrier for shipping damage. EV-TAPCO will cooperate fully in such event. Be sure to save the container as evidence of damage for the shipper to inspect.

The amplifier's mounting position must be chosen carefully so that the air flow to the sides of the unit is not restricted. Inadequate ventilation may cause the protective heat sensors to shut the unit off. For rack mounting, the four rubber feet on the bottom of the unit may be removed.

### DO NOT PLUG THE AMPLIFIER IN YET!

All connections should be made before power is applied.

## RACK MOUNTING HINTS

### KEEPING IT COOL

A power amplifier draws energy from a primary electrical service, usually a 120volts AC outlet, to drive loudspeaker systems with an audio signal. Typically, only half of the energy can be delivered to the loudspeakers; remaining energy is converted into heat, and must be dissipated (ventilated) into the air.

Air circulating past heat-producing components, absorbs the heat and carries it away. To accomplish this, low and medium power amplifiers rely on natural convection currents, while most high power amplifiers use fans. If the air flow is impeded, the resulting rise in heat may cause an amplifier to stop working or fail.

Circulating air currents must not be cut off when installing power amplifiers in racks. Power amplifiers using convection cooling require spacing between amplifiers to permit air flow between them. Power amplifiers using forced-air cooling, on the other hand, can usually be stacked closer to each other and may not need any blank panel spacing between amplifiers.

To improve natural convection currents within a rack, a chimney can be created by closing the back of the rack and venting the rack at the bottom to let in fresh air, and at the top to exhaust hot air. Vents should be large rectangular slots approximately 19" wide by 4" high.

The rack cabinet will require some type of blower if a large air-flow is required. It is best to exhaust air from the top of the rack rather than to blow it in from the bottom. There will be less dust and dirt in the rack this way, if the bottom vent is sufficiently large.

### INSTALLING THE UNITS

Use care when mounting equipment in a rack. Place the heaviest units near the bottom of the rack and fill in all unused rack spaces with blank panels. Equipment cannot always be supported by front panels alone. This is especially true of amplifiers whose depth is more than twice their height. Uniform support can be insured by installing bottom or side rails.

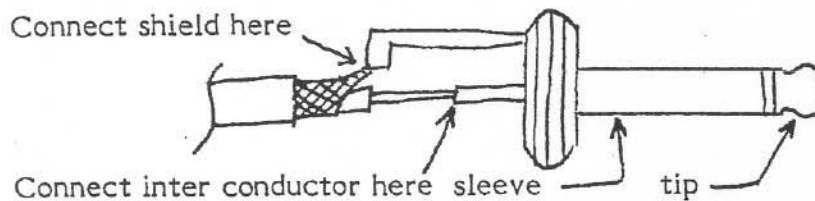
When racks are to be transported or used in a mobile installation, some means of securing the rear of the equipment are required. Angle brackets either attached to the bottom, side rails or rear panel are practical approaches.

## STEREO INPUT CONNECTIONS

Dual 1/4 in. phone jacks are provided on the rear of the amplifier for input connections.

### 1/4 INCH PHONE JACKS

The 1/4" phone jacks are for unbalanced lines only (single conductor, shielded) and may be used directly. Simply connect the shield to the outer sleeve of the plug and the inner conductor to the tip, or buy ready-made cables. See diagram below.

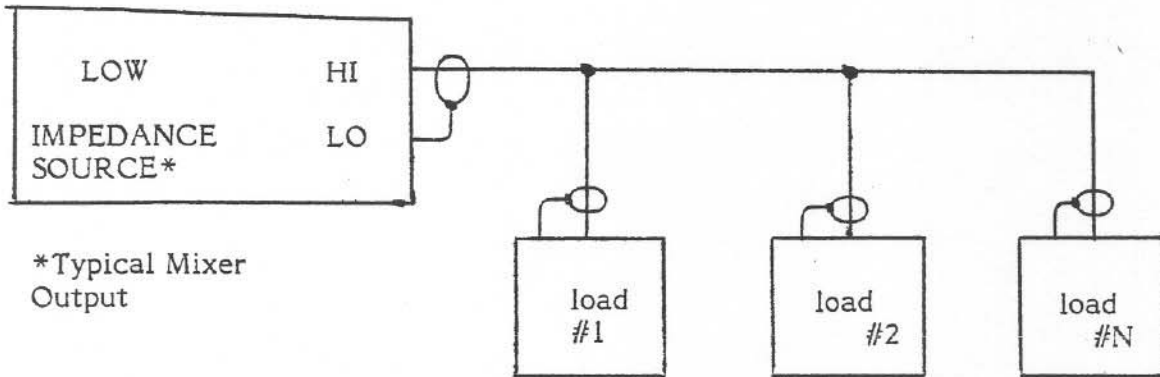


### FOR MONO (BRIDGED) OPERATION

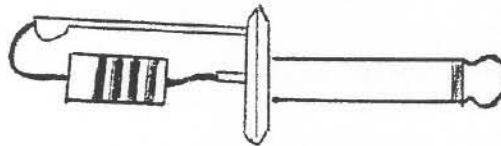
To operate the unit as a mono amplifier, use the Channel One (1) input only. DO NOT use the Channel two (2) input. Remember to place the stereo/mono switch in the mono operation.

## BRIDGING UNBALANCED LINE INPUTS

Used only when two or more devices are driven from the same Input line.



The Nth load may need a terminating resistor. It can be installed inside a Standard ¼" phone plug and inserted into the Nth amplifier.

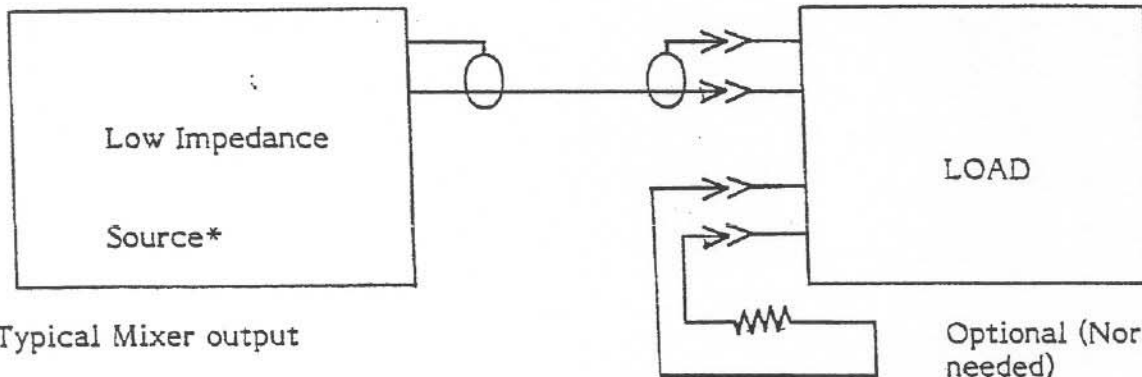


To find this resistor value see sheet "TERMINATING RESISTANCE CHART", MFRM 03051.

NOTE: Terminating resistance may be required when source is a transformer. Sources other than a transformer may not need a termination.

UNBALANCED LINE INPUT

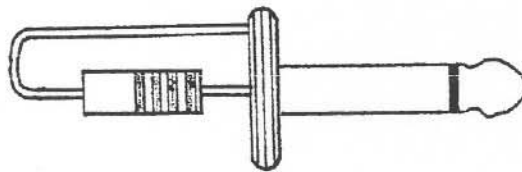
Used only when one amplifier is driven from one source



\*Typical Mixer output

Optional (Normally not needed)

**NOTE:** Terminating resistance may be required when source is a transformer. Sources other than a transformer may not need a termination. The resistor may be installed into a  $\frac{1}{4}$ " phone plug and the plug assembly inserted into the second input jack.



TERMINATING RESISTANCE CHART

How to find terminating resistance for balanced or unbalanced 600 ohm lines, driving more than one amplifier.

STEP A  $\frac{\text{*Input Impedance of Amplifiers}}{\text{Number of Amplifiers}} = \text{Total Load Impedance of Amplifiers}$

STEP B  $\frac{\text{Total Impedance of Amplifiers} - 600}{600} = K \text{ (Impedance Factor)}$

STEP C  $\left(\frac{1}{K} + 1\right) \times 600 \text{ ohms} = \text{Load Resistor Required}$

EXAMPLE:

Input Impedance of Amplifiers = 15,000 ohms  
Number of Amplifiers = 4

A  $\frac{15,000}{4} = 3750 \text{ ohms}$

B  $\frac{3750 - 600}{600} = 5.25$

C  $\frac{1}{5.25} + 1 \times 600 = 1.19 \times 600 = 714.29 \text{ ohms}$

Closest value is 715 ohms 1% metal film resistor.

\* Note all amplifiers must have the same input impedance. If not, use formula below:

$$\frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \frac{1}{Z_4} + \frac{1}{Z_{NTH}}} = \text{Total Load Impedance}$$

EXAMPLE:

Four (4) Amplifiers with input impedance of 15k, 30k, 30k and 7.5k

$$\frac{1}{\frac{1}{15K} + \frac{1}{30K} + \frac{1}{30K} + \frac{1}{7.5K}} = 3750 \text{ ohms}$$

## STEREO OUTPUT CONNECTIONS

Two sets of five-way binding posts, on the rear panel, serve as output connectors, with one black and one red binding post for each channel. Channel 1 leads go to the binding posts marked Channel 1; Channel 2, to those marked Channel 2.

Output leads are best connected, to the amplifier, with standard banana plugs; however, the five-way action of the binding posts permits the use of tinned wires or spade lugs.

Make certain that the speakers are properly phased. Connect the black or minus (-) terminal on the speaker cabinet to the appropriate black binding post on the amplifier. Connect the red or plus (+) terminal to the red binding post. Check to see that the stereo-mono switch on the rear of the amplifier is in the stereo position.

## SPEAKER PROTECTION

All speakers can be damaged by having too much power applied to them. Fuse protection is an effective and inexpensive way of preventing this from occurring. If your speaker system does not contain a fuse or a circuit breaker, a fuse should be placed in series with each speaker and the wire going to the red terminal on the rear of the amplifier.

Maximum protection can be obtained with fast-acting fuses. Use the value recommended by the manufacturer. If no value is specified, use the SPEAKER FUSE NOMOGRAPH MFRM - 03530 provided to select the correct value.

To use the chart, take a straightedge, such as a ruler, and line up the speaker's impedance with its peak music power rating. The proper fuse value can then be read from the center column. Choose a fuse that is closest to, and below, the value indicated.

## WIRE SIZE AND DAMPING FACTOR

The high damping factor of EV-TAPCO amplifiers results in a very clean bass response. Excessively long, and small diameter speaker wires can lower the damping factor and distort the lower frequencies. A damping factor of at least 50 should be maintained to insure good audio quality.

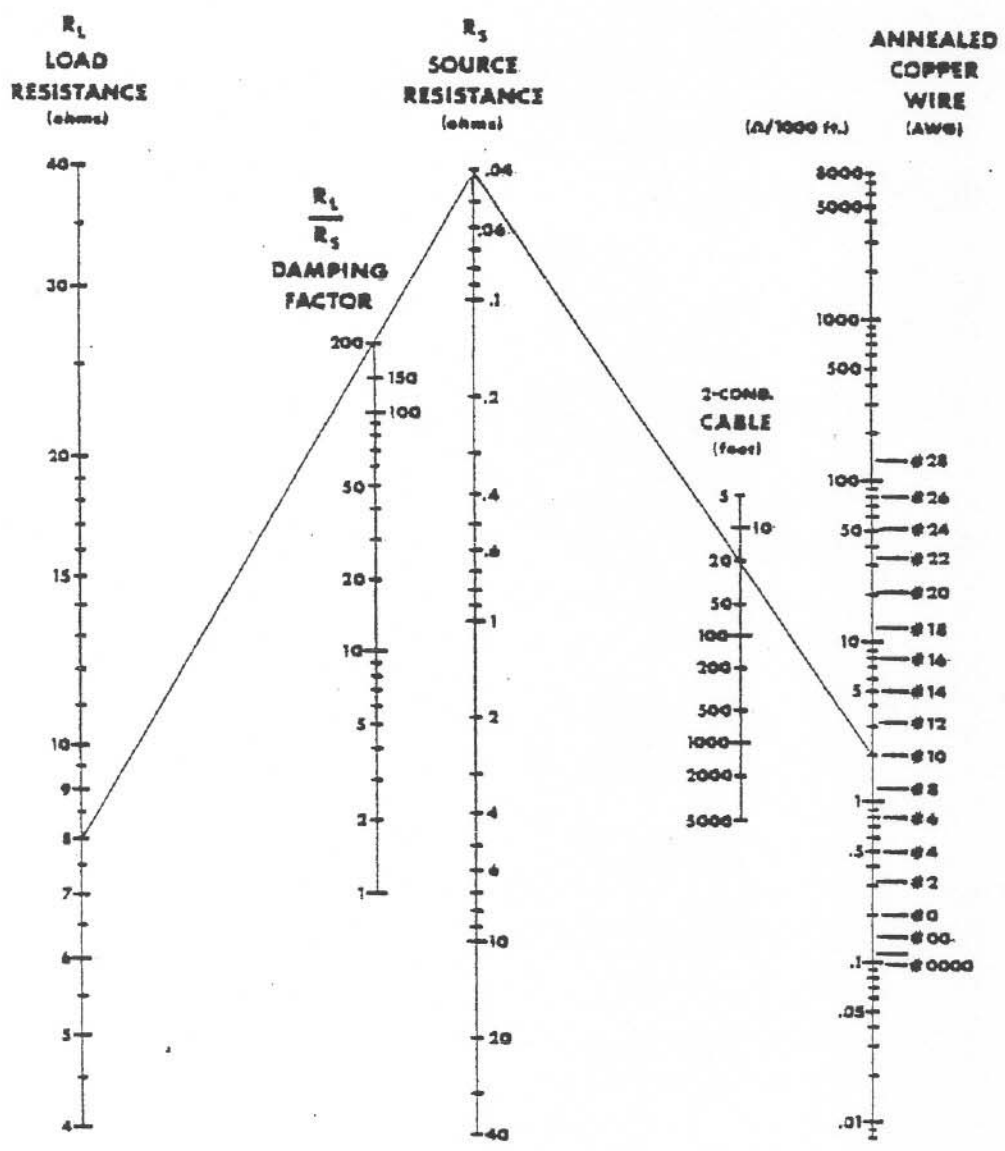
The relationship between wire length and diameter, and damping factor can be calculated using the DAMPING FACTOR NOMOGRAPH MFRM -03510. Proceed as follows:

1. Using a straight-edge, line up the gauge of the speaker wire with its length. Mark off the resulting source resistance where this line crosses the center column.
2. Line up the source resistance, determined in step #1, with the manufacturer's impedance\* of the speaker system. The damping factor can now be read.

\*The impedance of a speaker system can be approximated by measuring the resistance across the speaker terminals, with the amplifier disconnected. Multiplying this result by 1.33, gives you the approximate impedance.

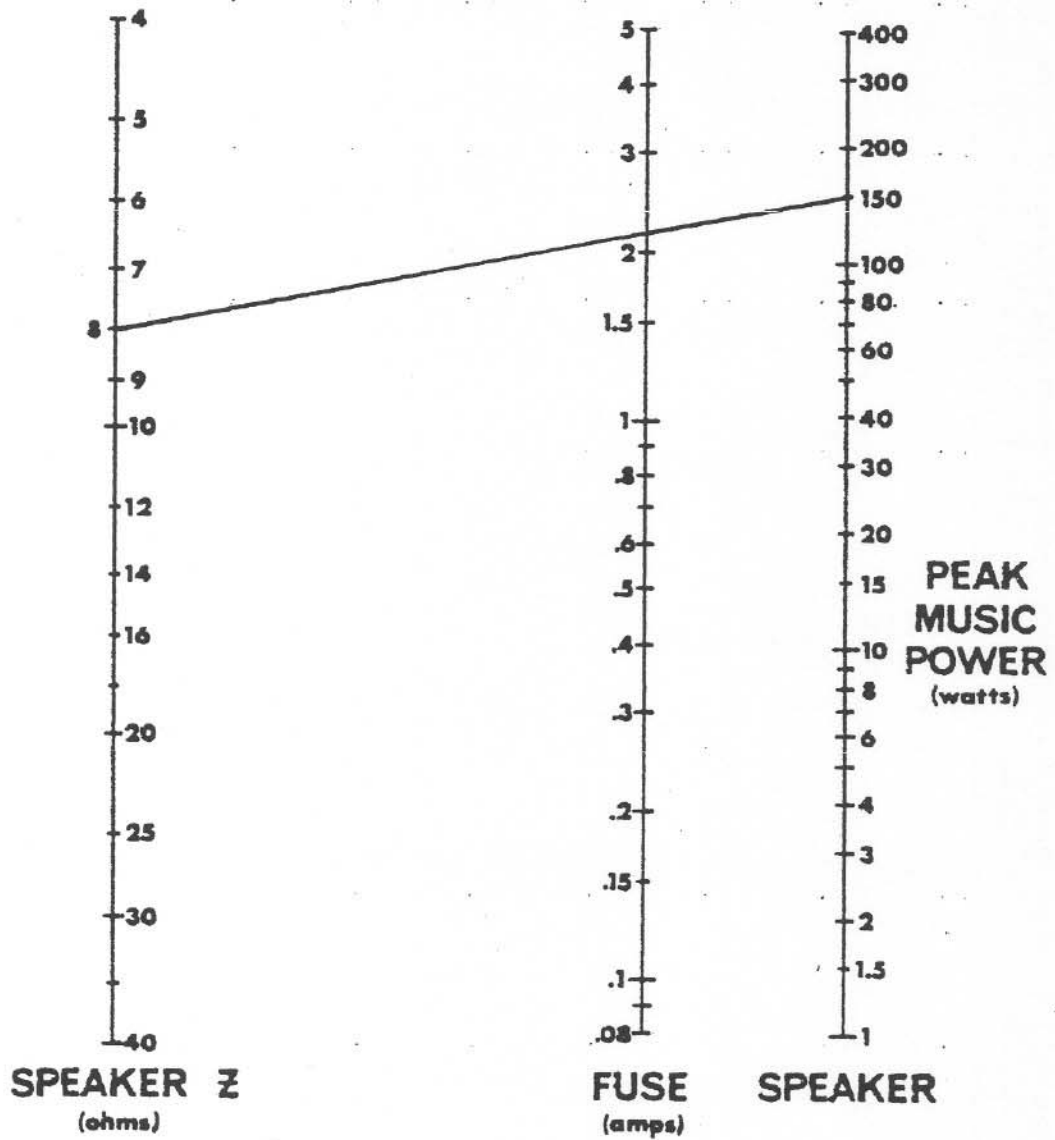
Note: This method cannot be used with electrostatic speakers.





EXAMPLE:  $R_L = 8\Omega$ ,  $R_S = .04\Omega$  OR D.F. = 200  
 CABLE LENGTH OF 20 FT. ANSWER: #10 WIRE

SOURCE RESISTANCE AND DAMPING FACTOR VS. LENGTH AND SIZE OF OUTPUT LEADS



EXAMPLE:  $Z = 8\Omega$ , PEAK POWER = 150W. ANSWER: FUSE = 2 AMPS

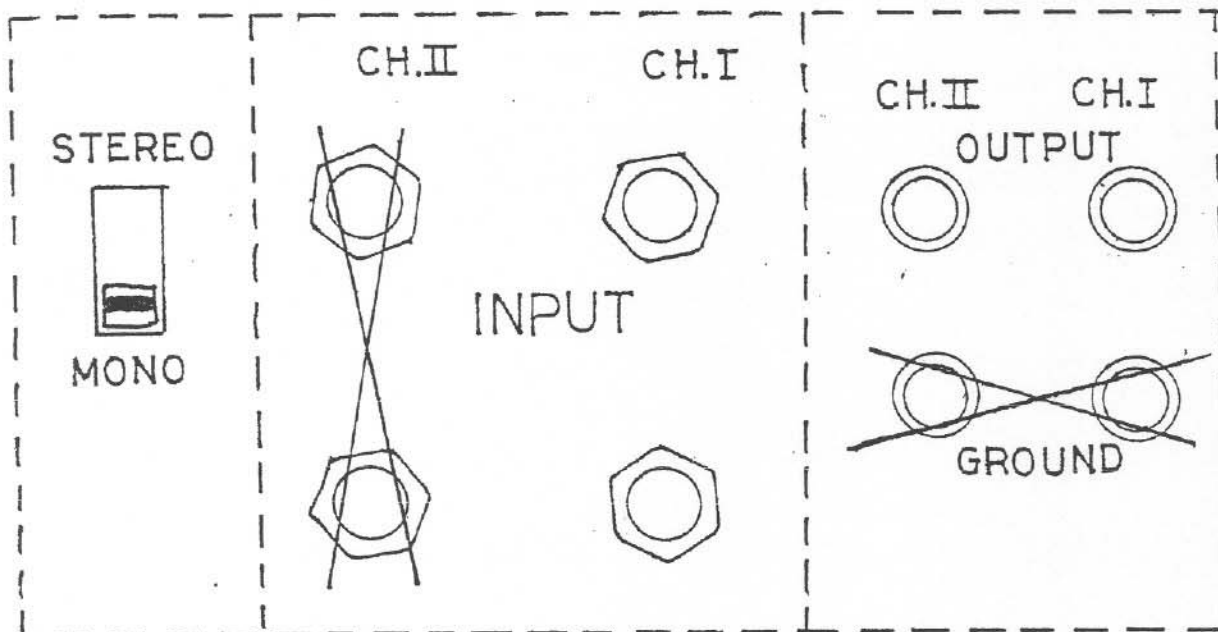
FUSE SELECTOR NOMOGRAPH FOR LOUDSPEAKER PROTECTION

MFRM - 03530

### MONO OPERATION

The output power of the amplifier can be increased by operating it in the mono (bridged) mode. The correct procedure for mono operation is as follows:

1. Set Stereo/mono switch to mono position.
2. Use Channel 1 input only. DO NOT use the Channel 2 input.
3. Connect the output across the two red binding posts. DO NOT use the black binding posts. DO NOT reference the load (speaker) to ground. Designate the Channel 1 red binding post (+) and the Channel 2 red binding post minus (-). Fuses, when necessary, should be placed in series with one red binding post.



NOTE: Minimum load impedance for mono operation should be 8 ohms.

### CIRCUIT DESCRIPTION

In the mono mode, the output of Channel 1 is fed into the inverting input of Channel 2. The two channels work opposite each other; when one goes positive, the other goes negative, thus doubling the output voltage swing. The single output is referenced between the two red binding posts.

### DRIVING 70.7 VOLT LINES

The amplifier will deliver 70.7 volts when used in the mono configuration. The output is balanced and neither side of the load may be grounded. Follow the instructions above for mono (bridged) operation.

When driving a 70.7 volt distribution system, use of an RC network is recommended. This limits the minimum impedance the amplifier sees at DC and subsonic frequencies and prevents unnecessary operation of the amplifiers protection circuitry.

The recommended network is 25 ohms/25 watt wirewound resistor in parallel with a 750mf/150v non polar capacitor (minimum value). This network is then placed in series with the plus side of the distribution system line.

## POWER MAINS CONNECTIONS

The unit should be plugged in only when it has been established that it is wired for the correct power mains voltage and after all other connections have been made.

The mains (AC line) voltage is indicated on the label on the rear of the unit. Products supplied for use in the United States and Canada are factory wired for 120 volts. Only the indicated mains voltage should be used. If the mains voltage must be changed, see POWER MAINS VOLTAGE CONVERSION.

A molded, parallel blade, U-ground plug is supplied. This connector is standard in the United States and Canada. For use elsewhere, the plug must be replaced with the correct connector. The color-code of the cord is as follows:

- HI (switched Leg) - Brown (or Black)
- LO (neutral Leg) - Blue (or White)
- EARTH (chassis ground) - Green with Yellow tracer (or Green)

## OPERATION

### PRECAUTIONS

1. Speaker destruction is often due to improper equipment operation. This often occurs when someone, without the proper appreciation for the components of a high power, high quality music system, has the opportunity to change records or adjust levels. The best protection here is caution. Keep the equipment out of the reach of untrained adults and children.

Make sure the speaker is properly protected with fuses (Output Connections Section).

2. Never parallel the two amplifier outputs together.
3. When driving any load with an impedance of less than 4 ohms, the load should be isolated from the amplifier with a series capacitor in order to avoid both damage to the load, and wasting of output power.
4. If the amplifier continuously shuts off, something is wrong - refer to Warranty and Service Station.
5. Do not connect an input ground lead to an output ground lead; to do so may cause a ground loop and oscillations.
6. Do not operate the amplifier from power mains which exceed the indicated mains voltage by more the 10%.
7. Never connect the output of the amplifier to another power source such as a battery or power main.
8. Do not expose the amplifier to corrosive chemicals such as lye, soft drinks, salt water, etc. Also, never immerse the amplifier in any liquid.
9. Do not remove the amplifier's cover.
10. The amplifier is designed for full power operation over the 20-20kHz audio band. High power operation above 20kHz should be avoided.
11. Neither the amplifier, nor any of its leads, should be exposed to areas likely to be struck by lightning.

## PROCEDURES

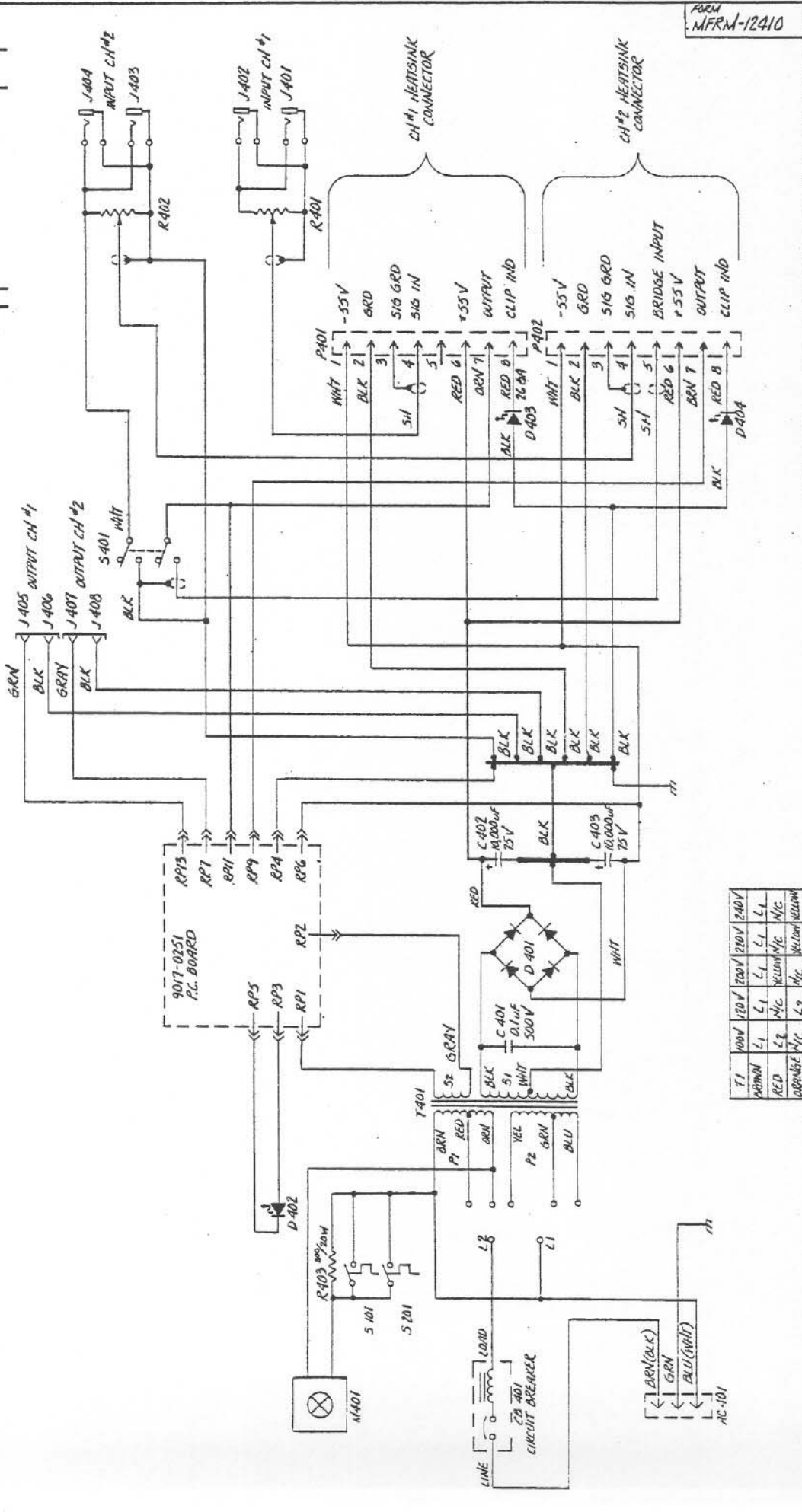
After all connections have been made to the power amplifier, turn the gain controls fully counter-clockwise. Turn on the preamplifier, then turn on the power amplifier. The red power should light. If it does not, check to see that the amplifier is plugged into a live power outlet.

With the mixer gain controls fully off, advance the Channel 1 and Channel 2 power amplifier gain controls about half way clockwise. There should be no audible hum; if hum is heard, check the connections between the power amplifier and mixer. Now advance both controls to FULL clockwise.

The amplifier incorporates a time delay network and a relay, which connects the speaker only after the amplifier has stabilized, thus eliminating transients.

Often turn-on transients originate in the pre-amp or tuner. This is especially true of tube-type units. If this situation arises, turn the amplifier on after the other units have had adequate time to stabilize.

REV	DESCRIPTION	DATE	APPROVAL



FORM MFRM-12410

DESIGN	DATE	REV
1-10-51	1-10-51	1
TITLE		
SCHEMATIC, CHASSIS, #PA-100 TAPCO		
SCALE	NO. OF SHEETS	SHEET 1 OF 1
NOTE	MFRM-12410	

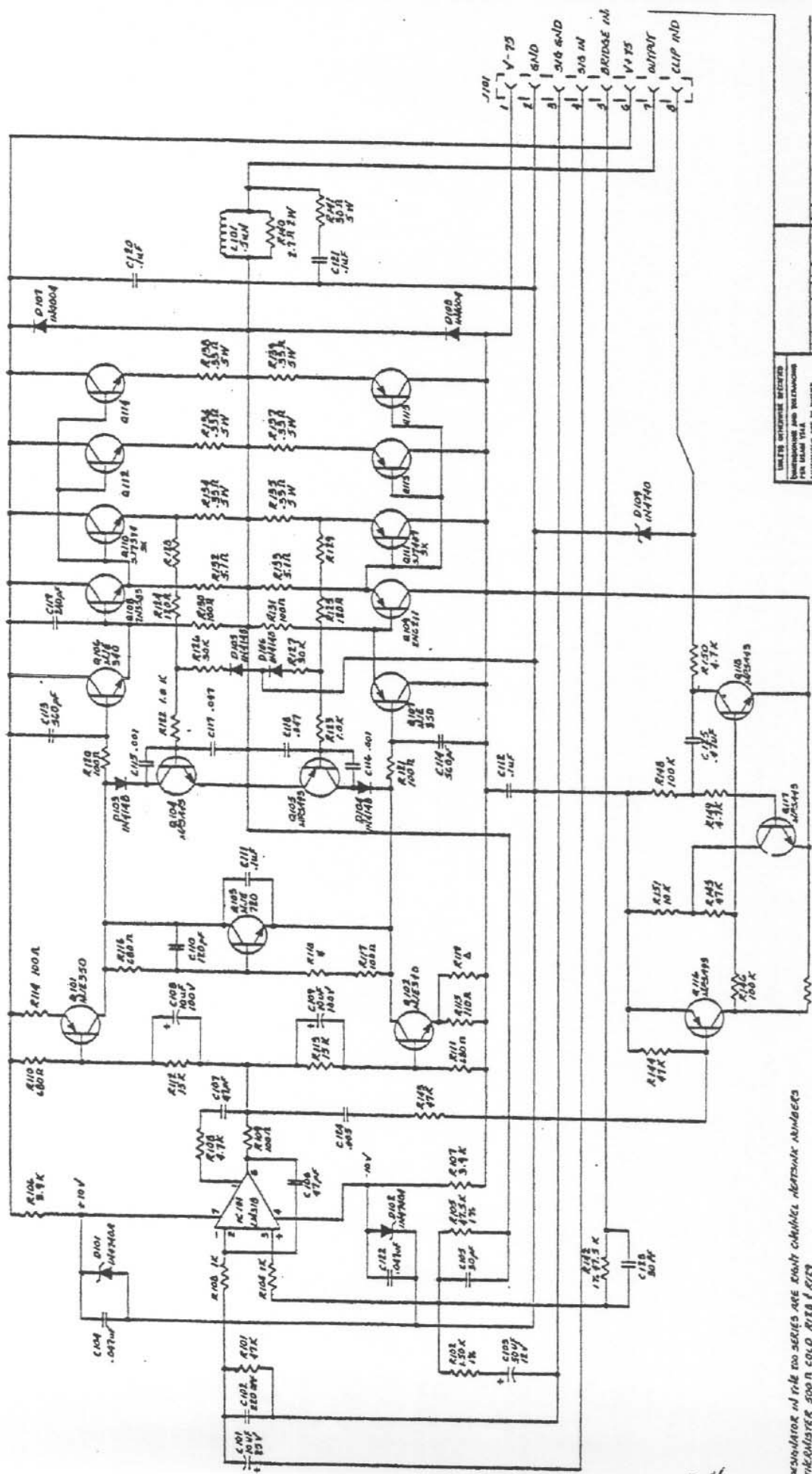
UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES PER THIS TITLE. DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS: XX = ±.01, XXX = ±.005, ALL OTHERS AS SHOWN. MAKE SHARP CORNERS AND SMOOTH PROFILES.

T	100V	170V	200V	220V	240V
BRN	L1	L1	L1	L1	L1
RED	L2	M/C	M/C	M/C	M/C
ORANGE	M/C	L2	M/C	YELLOW/YELLOW	L2
YELLOW	L1	L1	RED	ORANGE/ORANGE	L2
GREEN	L2	M/C	L2	M/C	M/C
BLUE	M/C	L2	M/C	L2	L2

M/C - NO CONNECTIONS

REF. PA-700  
NOTES: DIMENSIONS UNLESS OTHERWISE SPECIFIED





UNLESS OTHERWISE SPECIFIED  
DIMENSIONS AND TOLERANCES  
ARE IN INCHES  
DIMENSIONS ARE TO CENTER  
UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE TO CENTER  
UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE TO CENTER

SCHEMATIC, HEAT AMPLIFIER  
MODULE, POWER AMPLIFIER  
D MFPM-12420

- 1. RESISTOR IN PILE NO SERIES ARE ONLY CARRY NETWORK NUMBERS
- 2. THERMISTOR 500 OHM GOLD R108 / R127
- 3. CHECK THIS LIST FOR VALUES OF UNLABLED COMPONENTS.
- 4. MAY BE SELECTED FOR OPTIMAL OPERATION.
- 5. R108 TO BE SELECTED FOR 370 OHM QUARTER RESISTOR R102 OR R103
- 6. ALL RESISTORS 5% , EXCEPT AS SHOWN.

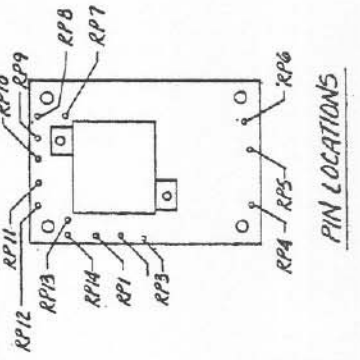
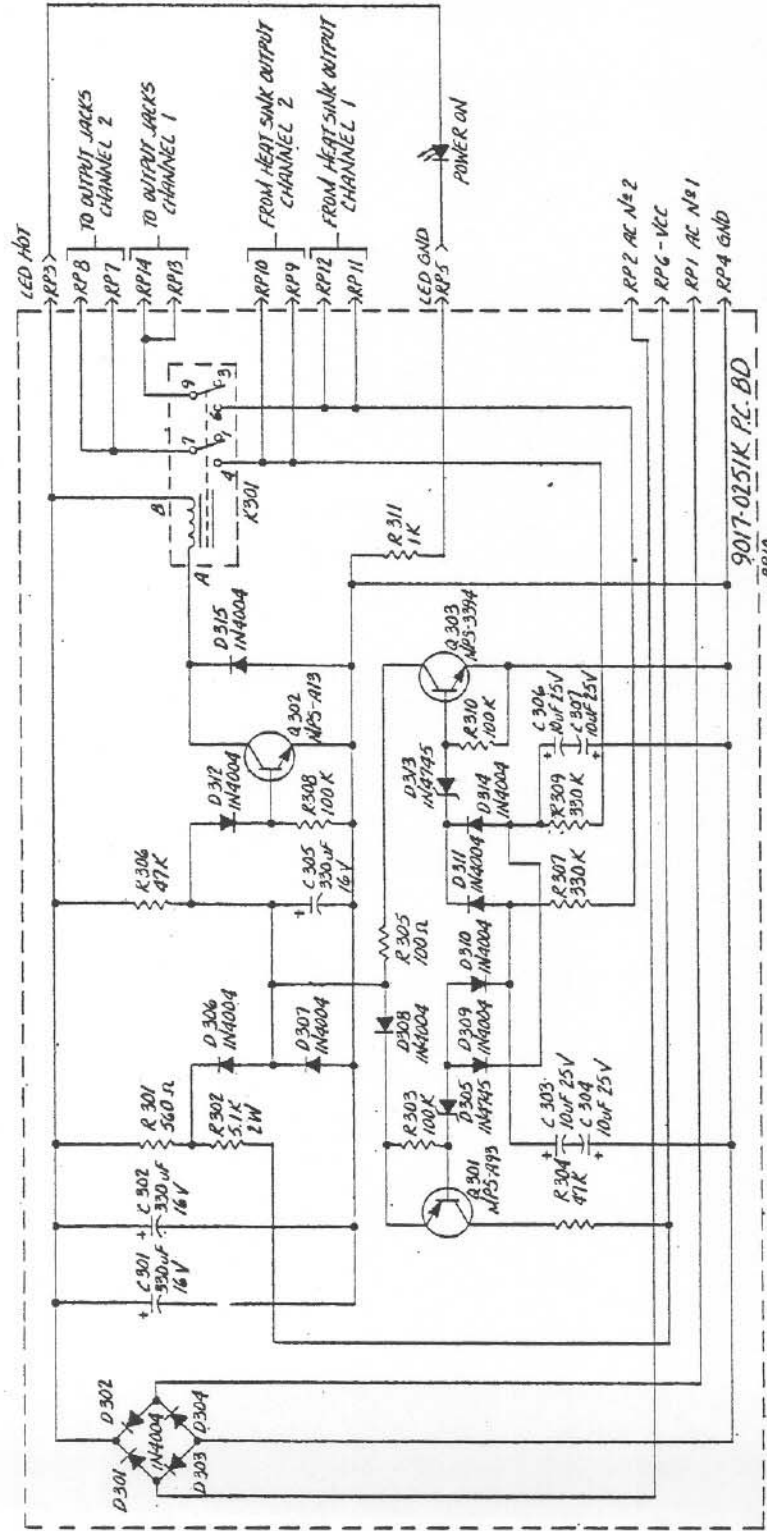
NOTES: UNLESS OTHERWISE SPECIFIED

REV	DESCRIPTION	DATE	APPROVED

FORM  
MFRM-12430

REV 1 OF 1  
SCALE  
DATE  
D MFRM-12430

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS AND TOLERANCES  
PER DRAWING SHALL BE IN INCHES  
AND DECIMALS THEREOF  
TOLERANCE ON DECIMALS  
XX ± .01 XX ± .02 XX ± .03  
TOLERANCE ON ANGLES ± .5°  
HOLE DIMENSIONS SHALL  
UNLESS OTHERWISE SPECIFIED

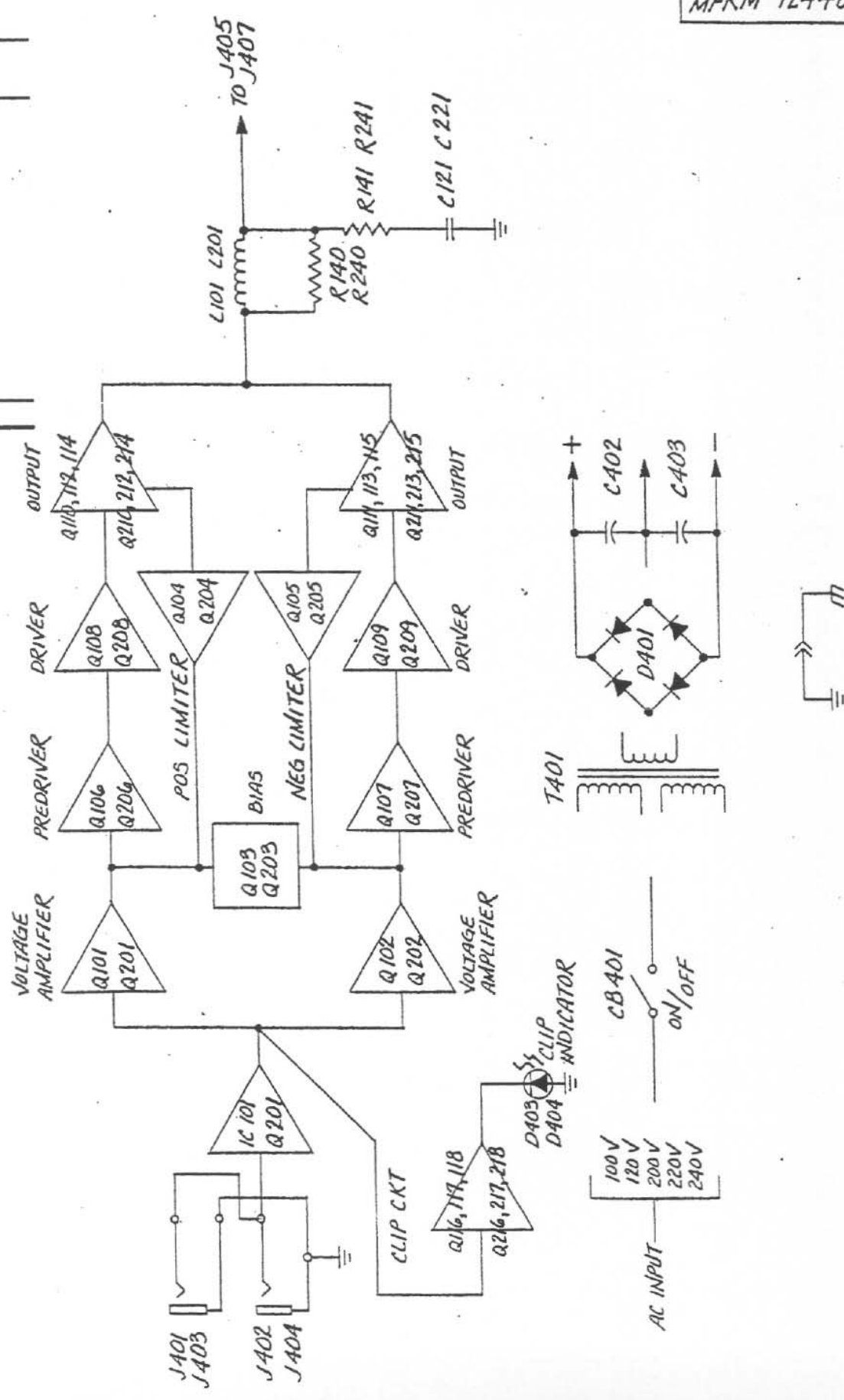


PIN LOCATIONS

1. ALL RESISTORS ± 5%, 1/2 W EXCEPT AS SHOWN  
NOTES: 1. UNLESS OTHERWISE SPECIFIED

REVISIONS		DATE	APPROVED
LTB	DESCRIPTION		

FORM MFRM-12440



DRAWN A.D. MANUEL		2-20-81	TITLE <b>BLOCK DIAGRAM, POWER AMP, TAPCO</b>	REV N
CHECKED K. [Signature]		2-20-81		
PROJECT ENGINEER			SIZE C	DRAWING NUMBER MFRM-12440
			SCALE NONE	IT 1 OF 1

UNLESS OTHERWISE SPECIFIED  
DIMENSIONING AND TOLERANCING  
FOR URSAI Y14S  
DIMENSIONS ARE IN INCHES  
AND APPLY AFTER PLATING.  
TOLERANCE ON DECIMALS:  
XX = ± .01 XXX = ± .010  
TOLERANCE ON ANGLES = ± 0° 30'  
BREAK SHARP EDGES R10 MAX.  
SURFACE ROUGHNESS 125 ✓

DO NOT SCALE DRAWING

1. REF: PA-100

NOTES:

ENG NO	DESCRIPTION	PART NO
***	PARTS LIST TAPCO PA700	***
		12480
	SCHMATIC CHASSIS MFRM 12410	
	SCHMATIC HEATSINK MFRM 12420	
	SCHMATIC RELAY BOARD MFRM 12430	
	BLOCK DIAGRAM MFRM 12440	
NOTE*	ALL COMPONENTS WITH DESIGNATIONS IN THE 200 SERIES ARE RIGHT CHANNEL HEATSINK NUMBERS - REFER TO 100 SERIES NUMBERS EXAMPLE C201 WOULD BE THE SAME AS C101	
	AC CORD	
AC401	AC POWER CABLE 3COND GROUNDED AMER 16GA	8709-0163
	CAPACITORS	
C101	10UF 25V DIPPED TANTALUM	0226-0010
C102	220PF 1KV DISC CERAMIC	0100-0220
C103	50UF 12V ALUMINUM ELECTROLYTIC	0456-0050
C104	.047UF 25V DISC CERAMIC	0129-0047
C105	30PF 100V DIPPED MICA	0060-0030
C106	47PF 1KV DISC CERAMIC	0100-0047
C107	47PF 1KV DISC CERAMIC	0100-0047
C108	10UF 100V ALUMINUM ELECTROLYTIC	0486-0010
C109	10UF 100V ALUMINUM ELECTROLYTIC	0486-0010
C110	120PF 500V DIPPED MICA	0090-0120
C111	.1UF 25V DISC CERAMIC	0129-0100
C112	.1UF 100V DIPPED MYLAR	0369-0100
C113	560PF 300V DIPPED MICA	0080-0560
C114	560PF 300V DIPPED MICA	0080-0560
C115	1000PF 1KV DISC CERAMIC	0100-1000
C116	1000PF 1KV DISC CERAMIC	0100-1000
C117	.047UF 25V DISC CERAMIC	0129-0047
C118	.047UF 25V DISC CERAMIC	0129-0047
C119	240PF 500V DIPPED MICA	0090-0240
C120	.1UF 100V DIPPED MYLAR	0369-0100
C121	.1UF 100V DIPPED MYLAR	0369-0100
C122	.047UF 25V DISC CERAMIC	0129-0047
C123	30PF 100V DIPPED MICA	0060-0030
C124	5000PF 500V DISC CERAMIC	0100-0005
C125	.47UF 100V DIPPED MYLAR	0369-0471
C301	330UF 16V RADIAL ELECTROLYTIC	0466-0330
C302	330UF 16V RADIAL ELECTROLYTIC	0466-0330
C303	10UF 25V DIPPED TANTALUM	0226-0010
C304	10UF 25V DIPPED TANTALUM	0226-0010

ENG NO	DESCRIPTION	PART NO
C305	330UF 16V RADIAL ELECTROLYTIC	0466-0330
C305	10UF 25V DIPPED TANTALUM	0226-0010
C307	10MF 25V DIPPED TANTALUM	0226-0010
C401	.1UF 500V CERAMIC DISC	0199-0100
C402	10000UF 100V COMP GRAD ELECTROLYTIC	0566-0010
C403	10000UF 100V COMP GRAD ELECTROLYTIC	0566-0010

## CIRCUIT BREAKER

CB401	CIRCUIT BREAKER 120V 10A	0650-1104
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## DIODES

D101	1N4740A ZENER	1900-4740
D102	1N4740A ZENER	1900-4740
D103	1N4148 DIODE	1900-4148
D104	1N4148 DIODE	1900-4148
D105	1N4148 DIODE	1900-4148
D106	1N4148 DIODE	1900-4148
D107	1N4004 DIODE	1900-4004
D108	1N4004 DIODE	1900-4004
D109	1N4740A ZENER	1900-4740
D301	1N4004 DIODE	1900-4004
D302	1N4004 DIODE	1900-4004
D303	1N4004 DIODE	1900-4004
D304	1N4004 DIODE	1900-4004
D305	1N4745 ZENER	1900-4745
D306	1N4004 DIODE	1900-4004
D307	1N4004 DIODE	1900-4004
D308	1N4004 DIODE	1900-4004
D309	1N4004 DIODE	1900-4004
D310	1N4004 DIODE	1900-4004
D311	1N4004 DIODE	1900-4004
D312	1N4004 DIODE	1900-4004
D313	1N4745 ZENER	1900-4745
D314	1N4004 DIODE	1900-4004
D315	1N4004 DIODE	1900-4004
D401	BRIDGE RECTIFIER K8H2502	1886-2502
D402	LED RED MV5053	1990-5053
D403	LED RED MV5053	1990-5053
D404	LED RED MV5053	1990-5053

## INTEGRATED CIRCUITS

IC101	LM318 OP AMP	1885 0318
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## JACKS

J101	8 PIN OCTAL SOCKET	1202-0008
J201	8 PIN OCTAL SOCKET	1202-0008
J401	2 CONDUCTOR 1/4IN INPUT JACK	9999-0111

ENG NO	DESCRIPTION	PART NO
J402	2 CONDUCTOR 1/4IN INPUT JACK	9999-0111
J403	2 CONDUCTOR 1/4IN INPUT JACK	9999-0111
J404	2 CONDUCTOR 1/4IN INPUT JACK	9999-0111
J405	3 WAY BINDING POST, RED	1231-0008
J406	3 WAY BINDING POST, BLACK	1231-0009
J407	3 WAY BINDING POST, RED	1231-0008
J408	3 WAY BINDING POST, BLACK	1231-0009

## RELAYS

K301	RELAY ASSY W/BLOW OUT MAGNETS 12VDC	0800-1001
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## INDUCTORS

L101	.5UH INDUCTOR	9999-2405
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## FAN

M401	FAN ASSY	8802-3450
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## PLUGS

P401	8 PIN OCTAL PLUG	1350-0008
P402	8 PIN OCTAL PLUG	1350-0008

## TRANSISTORS

Q101	MJE 350 PNP SI MED POWER PLASTIC	1853-0350
Q102	MJE 340 NPN SI MED POWER PLASTIC	1854-0340
Q103	MJE 720 NPN SI MED POWER PLASTIC	1854-0720
Q104	MPS A43 NPN SI LOW SIGNAL T092	1854-0043
Q105	MPS A93 PNP SI LOW SIGNAL T092	1853-0093
Q106	MJE 340 NPN SI MED POWER PLASTIC	1853-0340
Q107	MJE 350 PNP SI MED POWER PLASTIC	1853-0350
Q108	2N3583 NPN DRIVER TRANSISTOR	1854-0005
Q109	2N6211 PNP DRIVER TRANSISTOR	1853-0005
Q110	SJ7394 NPN POWER TRANSISTOR	1854-7394
Q111	SJ7407 PNP POWER TRANSISTOR	1853-7407
Q112	SJ7394 NPN POWER TRANSISTOR	1854-7394
Q113	SJ7407 PNP POWER TRANSISTOR	1853-7407
Q114	SJ7394 NPN POWER TRANSISTOR	1854-7394
Q115	SJ7407 PNP POWER TRANSISTOR	1853-7407
Q116	MPS A93 PNP SI LOW SIGNAL T092	1853-0093
Q117	MPS A43 NPN SI LOW SIGNAL T092	1854-0043
Q118	MPS A43 NPN SI LOW SIGNAL T092	1854-0043
Q301	MPS A93 PNP SI LOW SIGNAL T092	1853-0093
Q302	MPS A13 NPN SI DARLINGTON PLASTIC T092	1854-0013
Q303	MPS 3394 NPN SI PLASTIC T092	1854-3394



ENG NO	DESCRIPTION	PART NO
	RESISTORS	
R101	47K 1/2W 5% DEPOSITED CARBON	5005-4703
R102	1.5K 1/4W 1% METAL FILM	5001-1502
R103	1K 1/2W 5% DEPOSITED CARBON	5005-1003
R104	1K 1/2W 5% DEPOSITED CARBON	5005-1003
R105	47.5K 1/4W 1% METAL FILM	5001-4752
R106	3.9K 2W 10% WIRE WOUND	6020-3902
R107	3.9K 2W 10% WIRE WOUND	6020-3902
R108	4.7K 1/2W 5% DEPOSITED CARBON	5005-4702
R109	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R110	680R 1/2W 5% DEPOSITED CARBON	5005-6801
R111	680R 1/2W 5% DEPOSITED CARBON	5005-6801
R112	15K 1/2W 5% DEPOSITED CARBON	5005-1503
R113	15K 1/2W 5% DEPOSITED CARBON	5005-1503
R114	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R115	110R 1/2W 5% DEPOSITED CARBON	5005-1101
R116	680R 1/2W 5% DEPOSITED CARBON	5005-6801
R117	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R118	FACTORY SELECTED BIAS ADJUSTMENT	
R119	FACTORY SELECTED OFFSET ADJUSTMENT	
R120	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R121	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R122	1K 1/2W 5% DEPOSITED CARBON	5005-1003
R123	1K 1/2W 5% DEPOSITED CARBON	5005-1003
R124	120R 1/2W 5% DEPOSITED CARBON	5005-1201
R125	120R 1/2W 5% DEPOSITED CARBON	5005-1201
R126	30K 1/2W 5% DEPOSITED CARBON	5005-3004
R127	30K 1/2W 5% DEPOSITED CARBON	5005-3004
R128	THERMISTER 500 OHM COLD	6800-2402
R129	THERMISTER 500 OHM COLD	6800-2400
R130	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R131	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R132	5.1R 2W 5% WIRE WOUND BWH	4025-5010
R133	5.1R 2W 5% WIRE WOUND BWH	4025-5010
R134	.33R 5W 10% WIRE WOUND	4050-0330
R135	.33R 5W 10% WIRE WOUND	4050-0330
R136	.33R 5W 10% WIRE WOUND	4050-0330
R137	.33R 5W 10% WIRE WOUND	4050-0330
R138	.33R 5W 10% WIRE WOUND	4050-0330
R139	.33R 5W 10% WIRE WOUND	4050-0330
R140	2.7R 2W 5% WIRE WOUND BWH	4025-2070
R141	30R 5W 10% WIRE WOUND	4050-3001
R142	47.5K 1/4W 1% METAL FILM	5001-4752
R143	47K 1/2W 5% DEPOSITED CARBON	5005-4703
R144	47K 1/2W 5% DEPOSITED CARBON	5005-4703
R145	47K 1/2W 5% DEPOSITED CARBON	5005-4703
R146	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R147	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R148	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R149	4.7K 1/2W 5% DEPOSITED CARBON	5005-4702

ENG NO	DESCRIPTION	PART NO
R150	4.7K 1/2W 5% DEPOSITED CARBON	5005-4702
R151	10K 1/2W 5% DEPOSITED CARBON	5005-1004
R301	560R 1/2W 5% DEPOSITED CARBON	5005-5601
R302	5.1K 2W 10% CARBON COMP.	6025-5102
R303	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R304	47K 1/2 5% DEPOSITED CARBON	5005-4703
R305	100R 1/2W 5% DEPOSITED CARBON	5005-1002
R306	47K 1/2W 5% DEPOSITED CARBON	5005-4703
R307	33K 1/2W 5% DEPOSITED CARBON	5005-3303
R308	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R309	33K 1/2W 5% DEPOSITED CARBON	5005-3303
R310	100K 1/2W 5% DEPOSITED CARBON	5005-1005
R311	1K 1/2W 5% DEPOSITED CARBON	5005-1003
R401	22K DETENTED POTS	7006-2014
R402	22K DETENTED POTS	7006-2014
R403	300R 20W 10% WIRE WOUND	4200-3002

## SWITCHES

S101	THERMAL SWITCH COR 131F	0630-3441
S201	THERMAL SWITCH COR 131F	0630-3441
S401	SLIDE SWITCH, RECESSED HANDLE, DPDT	0620-6206

## TRANSFORMER

T401	TRANSFORMER, POWER	0900-0411
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## MISC. PARTS

KNOB, GAIN CONTROL	0700-0001
HANDLE, BLACK	0701-0001
SHOULDER INSULATOR LONG SHANK	0723-3448
MICA INSULATOR T03 INSULCOTE	0723-5603
MICA INSULATOR, T066 INSULCOTE	0723-5666
MICA INSULATOR TAB INSULCOTE	0723-5677
BOOT, CRIMP TYPE SLIP-ON LUG	0723-6125
BRASS PLATED STANDOFF A-1530-B	0772-0375
HEATSINK, AMPLIFIER MODULE	1000-0250
RELAY SOCKET	1204-1000
LUG MOLEX 02-08-1102	1231-1102
CLOSED END SPLICE	1231-2218
TERMINAL STRIP, 7 LUG, SOLDER TYPE	1231-3007
CAPACITOR BRACKET	1235-0004
FAN CLIP	1235-0407
STRAIN RELIEF CLAMP	1235-6034
#10 LUG CRIMP TYPE 12GA	1313-3457
#10 LUG CRIMP TYPE 16GA	1313-4123
SLIP-ON LUG BLUE INSULATED	1321-5305
SLIP-ON LUG 14GA	1322-9700
MOLEX PIN R93-12A	1349-9312
6-32X5/16 PH MS PHIL BLK	2111-3312



ENG NO	DESCRIPTION	PART NO
	6-32X3/8 PH MS PHIL BLK	2111-3375
	6-32X5/8 PH MS PHIL BLK	2111-3625
	8-32X1/4 PH MS PHIL BLK	2111-4250
	10-32X1/2 PH MS PHIL BLK	2111-5500
	4-40X1/4 PH MS PHIL CAD	2115-2250
	4-40X3/8 PH MS PHIL CAD	2115-2375
	6-32X5/8 PH MS PHIL CAD	2115-3625
	10-32X3/8 PH MS SLOT CAD	2125-5375
	6-32X3/8 FH MS PHIL BLK	2311-3375
	1/4-20X5/8 FH HEX SOC CAP BLACK	2331-6625
	10-32X3/8 ALLEN SOC CAP SCREW	2431-5375
	8-32X1/4 SOC SETSCREW CUP PT	2731-4250
	#4 ITL WASHER	8122-0000
	COMPRESSION WASHER FOR CASE 77 TRANSISTOR	8130-0000
	#6 ITL WASHER	8132-0000
	1/8 ID 1/2 OD FIBER WASHER	8135-0001
	#8 FLAT WASHER	8141-0000
	#8 ITL WASHER	8142-0000
	#10 FLAT WASHER	8151-0000
	#10 SPLIT WASHER	8154-0000
	3/8 ITL SMALL PATTERN WASHER	8172-0001
	6-32X1/4 HEX NUT	8530-0250
	8-32X5/16 HEX NUT	8540-0312
	8-32X5/16 HEX KEP NUT	8543-0312
	10-32X3/8 LOCKING HEX NUT	8555-0375
	1/4-20 LOCKING HEX NUT	8565-0437
	TUBING HEAT SHRINK BLK	8901-0125
	FRONT PANEL PA700	9000-0001
	CHASSIS PA700	9002-0001
	TOP COVER PA700	9005-0001
	PC BOARD HEATSINK PA700	9007-0003
	PC BOARD RELAY	9017-0251
	CARTON 23X17 7/8X8 7/8 PRINTED	9851-1251
	TAPE 3 EGGSHALL WHITE	9860-0002
	BAG POLY 10X4X.004 MIL	9899-0004
	BAG POLY 20X30X.004 MIL	9899-2030
	TIE WRAP 5 1/2	9999-0550
	RUBBER FEET	9999-5027
	FAN GRILL	9999-6039
	HOLD DOWN WIRE. RELAY	9999-9002

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## POWER MAINS VOLTAGE CONVERSION

**CAUTION:** These servicing instructions are for use by qualified personnel only. To avoid electric shock do not perform any servicing other than that contained in the Operating Instructions, unless you are qualified to do so. Refer all servicing to qualified service personnel.

Voltage conversion should be done by an EV-TAPCO Authorized Service Station only.

Connections

Remove the eight screws holding the top cover. The chart below indicates the proper transformer connections for each voltage.

PRIMARY CONNECTIONS					
AC VOLTS	100	120	200	220	240
XMFR - BRN	L1	L1	L1	L1	L1
XMFR - RED	L2	N/C	YEL	N/C	N/C
XMFR - ORN	N/C	L2	N/C	YEL	YEL
XMFR - YEL	L1	L1	RED	ORN	ORN
XMFR - GRN	L2	N/C	L2	L2	N/C
XMFR - BLU	N/C	L2	N/C	N/C	L2

NOTE: Refer to Chassis Schematic MFRM - 12410.